REMARKS

1. Restriction Requirement

The Office Action mailed November 19, 2003 requires restriction to one of three identified groups of claims:

I. Claims 1 – 13;

II. Claims 14 – 18; and

III. Claims 19[1] – 23.

Applicants affirm the provisional election of Group I with traverse. Specifically, Applicants traverse the restriction as improper pursuant to MPEP sections 806.05(e) in light of the U.S. Patent and Trademark Office's published Examination Guidelines for Computer-Related Inventions ("EGCRI"). In MPEP § 806.05(e) it states that "[i]n applications claiming inventions in different statutory categories, only one-way distinctiveness is generally needed to support a restriction requirement." Specifically, invention distinctiveness for a process and an apparatus for its practice requires a showing "(1) that the process *as claimed* can be practiced by another materially different apparatus or by hand, or (2) that the apparatus *as claimed* can be used to practice another materially different process." (*Id.*, emphasis in original). In the absence of such distinctiveness, a restriction requirement between claims directed to a process and an apparatus for its practice is improper. With respect to computer-related inventions, EGCRI §IV.B.2.(a)(i) clarifies that when an apparatus claim encompasses "*any and every* computer implementation of a process, when read in light of the specification, the claim should be examined on the basis of the underlying process" (emphasis in original). That section continues with an example of how to recognize such an apparatus claim. It will:

– define the physical characteristics of a computer or computer component exclusively as functions or steps to be performed on or by a computer, and
– encompass *any and every* product in the state class (e.g., computer, computer-readable memory) *configured in any manner* to perform that process. (*Id.*)

Application of the standard is illustrated in a hypothetical provided in EGCRI §IV.B.2.(a)(iii) by describing the subject matter to be recited in the patent specification. Specifically, "[t]he disclosure [should state] ... that it would be a matter of routine skill to select an appropriate

[1] There appears to be a typographical error in the Office Action.

conventional computer system and implement the claimed process on that computer system. The disclosure [need] not have specific disclosure that corresponds to the [exemplary] limitations recited in the claim (i.e., no specific software or logic circuit)." Under such circumstances, the "[c]laim encompasses any computer embodiment of process claim [and] patentability stands or falls with process claim." (*Id.*).

In the instant application, the claims included in Groups II and III define physical characteristics of computer components as functions performed by a computer. In addition, the specification does not include specific software, i.e., programming code, recited to define the those functions. It would be a matter of routine skill to select an appropriate conventional computer system and implement the claimed process on the computer system.

Thus, the computer-readable storage medium and substrate processing system defined by the claims included in Groups II and III encompass any and every product in the class configured in any manner to perform the process defined by the claims included in Group I. As a result, the claims included in Groups II and III should be rejoined with the claims of Group I as they necessarily stand or fall together, *i.e.*, the patentability the apparatus claims in Groups II and III hinges on the patentability of the method claims of Group I. It was therefore improper to restrict the claims of Groups II and III from the claims of Group I, and they should be rejoined.§

The restriction is also traversed based the fact that claims in each of Groups II and III are linking claims. To summarize the relevant law, "[t]here are a number of situations . . . in which an application has claims to two or more properly divisible inventions, so that a requirement to restrict the application to one would be proper, but presented in the same case are one or more claims (generically called "linking" claims) *inseparable therefrom* and thus linking together the inventions otherwise divisible." (MPEP § 809.03)(emphasis added). A common type of linking claim includes means for practicing a process linking proper apparatus and process claims. (*Id.*).

In the present case, Claim 14 defines an apparatus for performing the steps of the method recited in Claim 6, and Claim 17 defines an apparatus for performing the steps of the method recited in Claim 1. As such, they are both linking claims and it is improper to restrict them from Group I. Similarly, Claim 19 defines a substrate processing system that includes elements for performing the steps of the method recited in Claim 6, and Claim 22 defines a substrate processing system that includes elements for performing the steps of the method recited in Claim 1. In addition, Applicants respectfully contend that should the linking claims be

deemed allowable, then the restriction requirement would be improper and the requirement restricting the claims of the three Groups would need to be withdrawn (See MPEP 818.03(d)). Since each of the apparatus claims in Groups II and III is thus linked with the method claims of Group I, the claims of Groups II and III would not be divisible from those of Group I were the linking claims found to be allowable.

2. Claim Rejections

Claims 1, 2, 4, and 5 stand rejected independently under 35 U.S.C. §102(b) as anticipated by U.S. Pat. No. 5,252,178 ("Moslehi") and under 35 U.S.C. §102(e) as anticipated by U.S. Pat. Publ. No. 2001/0028922 ("Sandhu"); Claim 3 stands rejected under 35 U.S.C. §103(a) as unpatentable over Moslehi or Sandhu in view of U.S. Pat. No. 6,167,834; Claims 6 – 10, 12, and 13 stand rejected under 35 U.S.C. §103(a) as unpatentable over Sandhu in view of U.S. Pat. No. 5,061,838 ("Lane"); Claim 11 stands rejected under 35 U.S.C. §103(a) as unpatentable over Sandhu in view of Lane and further in view of U.S. Pat. No. 5,891,349; and Claims 6 – 13 stand rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Pat. No. 5,920,792 ("Lin") in view of Lane.

a. Claims 1 – 5

The rejections of Claims 1 – 5 are respectfully traversed. Neither Moslehi nor Sandhu discloses the limitations of Claim 1 requiring that the plasma source be disposed within the process chamber, nor do they disclose the required sequence of deposition, etching, and deposition steps in that order.

First, in the rejections relying on Moslehi, the Office Action cites Fig. 1 and the following as disclosing a plasma source disposed within the process chamber:

> Processes that the present invention permits include hybrid remote and local plasma processing, mixed radio-frequency magnetron and radio-frequency non-magnetron plasma processing, and multi-zone multi-frequency plasma processing.
> (Moslehi, Col. 3, ll. 20 – 25).

This language merely expresses that the multielectrode configuration of the process chamber shown in Fig. 1 of Moslehi may be used in a variety of configurations, but says nothing about the disposition of the plasma source. The variety of configurations may admittedly include both

remote and local plasma processing configurations, but there is nothing in the cited language to suggest that either of those configurations is achieved with anything other than conventional plasma sources disposed outside the process chamber.

Also, Applicants respectfully disagree with the assertion in the Office Action that "Moslehi teaches four deposition and etching cycles" (Office Action, ¶6). Rather than teach deposition and etching cycles, the language cited in the Office Action describes cycles of deposition and *cleaning*. The cleaning portions of the cycles are used to remove byproducts or deposits from various inner surfaces of the process chamber so that process uniformity and repeatability may be improved, and particle contamination reduced, during the deposition portions of the cycle (Moslehi, Col. 4, ll. 35 – 54). Nothing in Moslehi teaches or suggests that such cleaning cycles be performed with a wafer that has previously undergone a deposition cycle and remains in the chamber and under process conditions during the cleaning cycle that would result in "etch[ing] part of the first portion of the film" as the claims require. Indeed, all of the examples discussed in connection with Figs. 12 – 15 of Moslehi (*id.*, Col. 12, l. 45 – Col. 14, l. 18) specify only deposition parameters used in depositing layers on wafers; there is no discussion in these specific examples of any etchback of the deposited layers during a cleaning cycle, demonstrating that the Office Action's proposal to use a cleaning cycle to etch the deposited layer was never in the contemplation of Moslehi.

Second, Sandhu also lacks these disclosures. The Office Action does not cite any portion of Sandhu as disclosing that the plasma source is disposed within the process chamber. Indeed, Fig. 1 of Sandhu shows explicitly that the plasma source is not disposed within the process chamber. The only components shown in Fig. 1 to be disposed within the process chamber are the wafer 102 and a susceptor 107.

Sandhu describes a process that makes use of *simultaneous* deposition and etching components during a deposition process, as is well known for processes such as HDP-CVD or ECR-CVD. While Sandhu teaches a number of techniques to control the relative deposition and etching contributions during this deposition process (including adding a chemical etchant (Sandhu, ¶29) and providing an RF bias to the wafer (*id.*, ¶33)), it never discloses any phase in which the etching component dominates over the deposition component. That is, Sandhu teaches a process for filling a gap that always relies on a net deposition, even if the conformality is varied during different stages of the deposition by controlling relative deposition and etching contributions. This is illustrated, for example, in the description of the sequence of figures 2a –

2d (*id.*, ¶¶41 – 42). At no time is there a separately delineated etching phase in that sequence where there is a net etching of a first portion of a film, as the claims require.

b. Claims 6 – 13

Independent Claim 6 has been amended to require that the plasma coupling structure be disposed within the process chamber and to clarify that it is the surface interior to the process chamber that is disposed to separate the plasma from the plasma coupling structure; there was no intent to claim that the poloidal flow is disposed to separate the plasma from the plasma coupling structure, as the Office Action appears to have construed the original claim. Corresponding amendments have been made to apparatus Claims 14 and 19.

Sandhu in view of Lane

Many of the rejections of Claims 6 – 13 rely on a combination of Sandhu and Lane, with certain other references cited for some dependent claims. It was noted above that Sandhu does not disclose a plasma source disposed within the process chamber, and it therefore also does not disclose a plasma coupling structure disposed within the process chamber. Lane also fails to disclose a plasma coupling structure disposed within the process chamber. It is plain from Fig. 1 of Lane that the inner coil 12, outer coil 10, mirror coils 16 and 17, upper coil 18, and lower coil 20 are all disposed outside the process chamber.

Also, neither Sandhu nor Lane discloses a surface interior to the process chamber that separates the plasma from a plasma coupling structure also disposed within the process chamber. It is believed that this is self-evident from Fig. 1 of Sandhu and from Fig. 1 of Lane, and that the assertions in the Office Action resulted from the unintended construction of the claim.

Lin in view of Lane

Claims 6 – 13 also stand rejected over a combination of Lin and Lane. The Office Action acknowledges that Lin does not disclose the specific claim limitations related to the plasma coupling structure and relies on Lane. As explained above, however, it is believed that with the intended construction of the claims as clarified by the amendments, it is self-evident that those limitations are not disclosed in Lane.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,

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